PLC & SCADA Automation Training (Beginner to Advanced)

Course Description:
This comprehensive hands-on training program takes participants from **beginner to advanced** levels in Industrial Automation. It provides in-depth practical knowledge of PLC programming, SCADA system development, industrial networking, and automation project execution. Using Siemens TIA Portal and WinCC, learners will design and implement real-time industrial monitoring and control applications. The course combines foundational theory with practical lab exercises to ensure participants gain the technical skills required for automation system design, programming, integration, and troubleshooting in modern industrial environments.

Audience Profile:
- Automation, Electrical, Electronics, and Instrumentation Engineers
- Diploma, BTech, and MTech Students
- Maintenance, Service, and Commissioning Professionals

Prerequisite:
- Basic understanding of electrical circuits and industrial systems
- Familiarity with computers and engineering software tools

Course Objectives:
Upon completion of this course, participants will be able to:
- Understand industrial automation principles and control architectures
- Configure and program Siemens PLCs using TIA Portal
- Design and develop SCADA systems using WinCC
- Integrate PLC and SCADA for real-time monitoring and control
- Apply industrial communication protocols (PROFINET, PROFIBUS, Modbus)
- Troubleshoot and maintain automation systems effectively
- Implement safety and diagnostic measures in automation environments

Table of Contents:

Module 3: TIA Portal Engineering Environment
- Project Creation & Hardware Setup
- Configuring CPU & IO Modules
- IP Addressing & PG/PC Interface
- Program Load, Backup & Diagnostics

Module 4: PLC Programming Basics
- PLC Scan Cycle Explanation
- Addressing Bits, Memory & Registers
- Ladder Logic: AND, OR, Seal Logic
- Motor Interlocking and Control Logic

Module 5: Timers, Counters & Comparators
- TON, TOF, TP Timer Applications
- Up/Down Counters in Automation
- Arithmetic & Comparison Instructions

Module 6: Advanced PLC Programming
- Functions (FC) and Function Blocks (FB)
- Data Blocks (DB) – Global & Local Memory

Module 7: Analog Signal Processing
- 0–10V and 4–20mA Sensors
- Signal Scaling & Filtering

Module 8: Industrial Communication Networks
- PROFINET, PROFIBUS, Ethernet
- Modbus TCP/RTU Communication
- PLC ↔ SCADA Data Mapping
- Real-Time Data Logging Concepts

Module 9: SCADA Development
- SCADA Project & Tag Database Setup
- Screen Design, Animation & Object Linking
- Alarm Management and Trend Logging
- User Security & Runtime Deployment

Module 10: Industrial Safety & Troubleshooting
- Emergency Stop & Safety Relay Wiring
- Fault Diagnostics & Monitoring Tools
- I/O Forcing & Cross Reference Tracking
- Error Memory and Diagnostic Buffer